

33. *A Specimen of Fracture of the Odontoid Process of the Axis, with perfect Anchylosis of its Apex with the Occipital Bone, and Partial Luxation Forward of the Atlas.*—Dr. PHILIP BEVAN communicated this remarkable case to the Surgical Society of Ireland:—

This specimen was discovered accidentally whilst making a dissection of the ligaments of the spine. On opening the spinal canal, and removing the dura mater, the perpendicular ligament or apparatus ligamentus colli was normal in size and strength, but on removing it, the apex of the odontoid process of the axis was found to be connected by perfect bony union to the anterior margin of the foramen magnum of the occipital bone, whilst its neck was attached to the body of the bone by a fibrous substance, about three-quarters of an inch long, of great strength and thickness, which closely resembled that which ordinarily unites the fragments of a broken patella. On cutting into this substance, the transverse ligament was found of its usual strength and thickness, retaining its normal connection to the atlas on either side, but completely altered in its relations and position; for instead of passing behind the odontoid process, with a concave surface covered with cartilage and synovial membrane, directed towards that process, it now lay between the broken off point of the odontoid process and the body of the axis, with flat surfaces upwards and downwards. It still presented its usual glossy appearance when dissected from the fibrous tissue in which it was imbedded, and was fully as strong as in the natural state; but the smooth, articular surface and synovial membrane were removed from its anterior surface. Not a vestige of either the moderator or suspensory ligaments remained. Having dissected the anterior surface of the spine, the upper articular processes of the atlas retained the normal relations to the occipital condyles; but the lower ones were thrown forwards, considerably in front of their natural position on the dentata, and were supported there by a bony growth from the anterior margin of its articular processes; in fact, the atlas was partially luxated forwards, for want of the support of the odontoid process, and the axis was modelled so as to support that vertebra in its new position.

The anterior atlanto-axoidal ligament was very strong, and must have served to prevent further displacement of the atlas.

On examining the bones the following changes were found to have taken place: The occipital foramen magnum was completely changed in shape, being heart-shaped, instead of oval, owing to the attachment of the apex of the odontoid to the centre of its anterior margin.

Its transverse diameter is greater than the antero-posterior, the former being one inch and a quarter, whilst the latter is only 10–12th of an inch.

The most normal size is the reverse of the above.

The apex of the odontoid is so completely incorporated with the occipital bone, that, but for a slight crack on the right side, no appearance of the line of union would be perceptible; the base of it is *smooth as if cut with a knife*, where it was attached by a fibrous tissue to the body of the axis. The occipital condyle of the right side is unaltered, but that of the left side is changed in shape, axis, and direction, being flat, circular, and directed downwards and outwards; transversely larger than natural; about three-fourths of an inch in diameter; smooth and covered with cartilage on its surface, but rough and irregular round the margin. The inner surfaces of the condyles are quite smooth, instead of being rough, for the attachments of the moderator ligaments.

The upper articulating surfaces of the atlas are not much altered; the left one is more round than oval, and not contracted in the centre, as in the normal state. The lower articular processes, on the other hand, are much altered, being rough and irregular on the surface, surrounded by a bony growth, as in cases of chronic rheumatic arthritis, and much larger than natural, especially in the antero-posterior diameter; but the chief alteration has taken place in the anterior ring of the bone; it is contracted inferiorly by irregular growths from the lower articular processes. The posterior surface of the ring is prominent and rather rough (instead of being smooth and lined with cartilage and synovial membrane); it was here firmly united to the fibrous tissue, which united the apex to the base of the odontoid process. The lower surface of this ring is thick and broad,

where it lay on the upper surface of a process of bony growth from the anterior margin of the odontoid process.

The axis is also much altered; the body of the bone terminates above, in the base of the odontoid, from which the apex has been broken; from the front of this a bony mass has grown in a groove, on the top of which rested the anterior ring of the atlas, with which it was connected by the above-mentioned mass of fibro-cartilage; the upper articular processes are on different planes, the left being lower than the right, both of them are much enlarged by bony growth from their anterior margin, which overhangs the body of the bone to the extent of a quarter of an inch. This served as a support for the luxated articular processes of the atlas. The surfaces are rough and were covered by a very imperfect cartilage; the right is convex; the left concave.

The remains of the base of the odontoid is rough and very convex towards the vertebral canal; its upper surface is very irregular, being grooved transversely in front for the anterior ring of the atlas and behind for the attachment to the fibro-cartilage. It is much enlarged by the bony growths above described, being about two inches in circumference at the part corresponding to the neck of the process, and is so rough and irregular as to give it much the appearance of the bone represented in Mr. Adams' book, "on Rheumatic Arthritis."

I am not aware of any case similar to the above. Rokitansky says that, "in a few cases, fracture of the odontoid process has not only not proved fatal, but has existed for a considerable time without union of the fragments. A specimen of this kind is contained in the Vienna Museum."

He gives no particulars concerning it, says nothing of the state of the moderator ligaments, or whether the point of the odontoid was ankylosed to the occiput; nor does he mention the partial luxation of the atlas.

The specimen was taken from a woman aged about 40, who died of dysentery in one of the Dublin unions; all her bones were healthy and strong.

Although it is impossible to obtain a history of such a case, yet I had sufficient evidence that she never had anything remarkable about the motions of her neck; nor had she ever complained of pain or stiffness. Indeed, an examination of the preparation would prove that she must have had considerable power of moving the neck, as the fibrous tissue, which united the base and apex of the dens, although very strong, would permit a considerable amount of twisting, which with the ordinary circumduction of the remaining cervical vertebræ would be sufficient for all ordinary purposes, and the nodding motions could not have been interfered with.

It was, till lately, a generally received opinion that both luxations and fractures of the odontoid process were necessarily fatal. Thus Chelius says, "that if fractures occur with luxation above the third vertebra, death speedily ensues." Samuel Cooper says, "that whenever the processus dentatus is suddenly displaced or fractured, the effects on the medulla spinalis must be immediately fatal." Sir A. Cooper, Boyer, and Dupuytren, all declare that such cases are necessarily fatal. This opinion can no longer be admitted as regards fractures of the odontoid process, although I believe it is correct as regards luxations of that bone; for I cannot find any case of recovery where this process was proved by dissection to have been luxated without fracture. Two cases of supposed reduction of luxations of the axis are given in Malgaigne, but in both the diagnosis was very doubtful; in the first, the only important symptom was, that the head was bent forwards, so that the chin rested on the sternum. This might have been a luxation of any other cervical vertebra; and, in the second, although the constitutional symptoms were more important, and the head was thrown backwards and to the right side, still it was equally doubtful which vertebra was luxated, or indeed whether any vertebra was luxated. The interesting cases given by Dupuytren in his work "On Fractures," prove that it is extremely difficult to diagnose between severe contusions of the muscles and ligaments of the neck, and luxation of the cervical vertebra. In one of these cases the head rested on the left shoulder, could not be straightened, was accompanied with violent pain in the opposite side of the neck, numbness of the corresponding arm and cheek, difficulty of deglutition, and inability to turn the head without the body; in fact, all the symptoms of luxation were present, and a luxation

was supposed to exist; yet, in a few days, all these symptoms were removed by mere leeching and stuping. It is difficult to believe that a luxation of the odontoid process without fracture could occur without death supervening, if we recollect that either the transverse ligament must be broken, or the point of the process must pass under that ligament, which cannot occur without laceration of both the moderator and perpendicular ligaments, and that, in either case, the process must directly press upon the medulla oblongata, on the slightest motion of the head forwards.

But although luxations of the odontoid process must be fatal from pressure on the medulla, fractures of that process are by no means necessarily so. No doubt most of these must be fatal, either from the fearful shock to the system caused by such an amount of violence as is required to break that bone, or from the extravasation of blood on the medulla; but should the patient escape those dangers, there is no necessity for him to die of pressure of either of the fragments on the cord: in fact, the apex will be kept *in situ* by the moderator and transverse ligaments, whilst the base is retained by the powerful apparatus ligamentosus colli. In experiments on this subject, having first cut across the odontoid process with a fine saw, without injuring the ligaments, in attempting to force the spine forcibly forwards, I found that the bones themselves gave way before any considerable amount of pressure was made on the medulla by the body of the axis, owing to the great strength of this ligament.

Malgaigne has collected three cases of this fracture of the odontoid with luxation of the atlas; in one, the patient lived seventeen days; in the second, he lived for one month and six days; and, in the third, he lived for four months.

Whilst a still more interesting case is given by Dr. Parker, of New York, where the patient walked about on the fifth day after the accident; on the ninth day resumed ordinary occupations; continued at his work notwithstanding constant pain in the head and neck, for five months, when he suddenly became paralyzed and died; yet the odontoid process was broken off, and its lower extremity was pressing on the cord at the time of his death.

This specimen proves, not only that a patient may live for months but for many years, as there can be little doubt that the accident happened in very early life. Indeed, that it occurred before the union of the epiphysis was consolidated to the body of the bone is rendered extremely probable, by the ankylosis of its apex to the occiput, as it is well known that the point of that process is the last part ossified, and would, therefore, be more likely to become adherent at that time than after the process of ossification had been completed. The alteration in the shape of the anterior ring of the atlas, and the smoothness of the surfaces of the occipital condyles, where the moderator ligaments were attached, would lead to a similar conclusion.

In order to produce the accident, the neck must have been first violently twisted, so as to tear away the moderator ligaments, and then the neck must have been flexed backwards or forwards to break the odontoid process. The only practical deduction to be drawn from these cases is the necessity that perfect rest should be observed, and that a long time should elapse before a patient, who has received an obscure injury of the cervical region, should be permitted to support the weight of the head on the spine. Had Dr. Parker's case submitted to restraint, it is quite possible the broken bone might have united, and the patient lived as long as in the present case.—*Dublin Med. Press*, February 18, 1863.

34. *Foreign Bodies in the Ear*.—DR. VOLTOLINI says that the first thing we have to do is to assure ourselves that a foreign body really is within the ear, for it by no means rarely happens that persons apply under the belief that an insect or other body is within the ear, which the most exact inspection fails to discover. In some cases, inflammation of the membrana tympani is the cause of the deceptive sensation, and this becomes aggravated by the unsuccessful

¹ This ligament is so strong that it has been divided into three layers by Dr. Humphrey in his excellent work "On the Bones."